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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/572,187	05/18/2007	Christopher Peter Jones	M03B154	2652

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EXAMINER	
RAPHAEL, COLLEEN M	

ART UNIT	PAPER NUMBER
1724	

NOTIFICATION DATE	DELIVERY MODE
10/18/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

LORETTA.SANDOVAL@EDWARDSVACUUM.COM

Office Action Summary	Application No.	Applicant(s)	
	10/572,187	JONES ET AL.	
	Examiner	Art Unit	
	COLLEEN M. RAPHAEL	1724	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 August 2011*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1,2 and 4-14* is/are pending in the application.

5a) Of the above claim(s) _____ is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,2 and 4-14* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. Claims 1, 2, and 4-14 are current in the application. Claims 1, 2, and 4-14 are currently under examination. Claim 3 has been cancelled by Applicant.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (US 5,584,981) in view of Bridger et al (US 5,225,056) and further in view of Kust et al.

5. Regarding claim 1, Turner et al teaches a method for treating an aqueous stream containing both anionic and cationic species, the method comprising the steps of: continuously circulating water through a loop incorporating an ion adsorption unit comprising a water permeable layer of an ion adsorbing material (col. 2, lines 49-50); feeding to the loop an aqueous solution containing the anionic species and the cationic species (Fig. 2, col. 6, lines 2-4); continuously passing the circulating water including the aqueous solution containing the anionic and the cationic species through the ion adsorbing material in the ion adsorption unit while applying an electric potential across the thickness of the water permeable layer of ion adsorbing material and removing from the ion adsorption unit an anolyte containing the anionic species in an increased concentration and a catholyte containing the cationic species in an increased concentration (col. 6, lines 4-12); continuously discharging from the ion adsorption unit the catholyte (col. 6, lines 11-15); continuously discharging from the ion adsorption unit the aqueous solution depleted in the

anionic species and cationic species as a result of the aqueous solution passing through the ion adsorption unit (col. 6, lines 4-9). Turner et al teaches that a concentrated aqueous ammonium solution (i.e. alkaline eluate) is continuously discharged from the ion adsorption unit (col. 6, lines 54-56).

6. Turner does not explicitly teach continuously passing the more concentrated solution of the anolyte through a reaction unit in which the anionic species reacts with a reactant added to the reaction unit to form a water-insoluble solid material, continuously passing eluate from the reaction unit to the ion adsorption unit; and, if necessary, adding to the loop a quantity of water corresponding to the quantity of aqueous solution removed from the reaction unit.

7. Bridger teaches continuously passing the more concentrated solution of the anolyte through a reaction unit in which the ionic species reacts with a reactant added to the reaction unit to form a water-insoluble solid material (where the Examiner is construing the ion exchange cell as the reaction unit) (col. 3, lines 15-24); continuously passing eluate from the reaction unit to the ion adsorption unit (col. 3, lines 25-28); and, if necessary, adding to the loop a quantity of water corresponding to the quantity of aqueous solution removed from the reaction unit (col. 4, lines 3-5). Bridger teaches that this allows separation of ions in solution whose compounds (e.g. metal ions and metal hydroxides) have different solubilities in solution. (col. 1, lines 25-29)

8. Neither Turner et al nor Bridger et al explicitly teach removing the water-insoluble material from the reaction unit.

9. Kust et al teaches a method for removing dissolved fluoride from waste water by passing an aqueous fluoride solution into a calcium precipitation unit thereby to form CaF_2 (i.e. an insoluble precipitate, col. 1, lines 55-65). (col. 2, lines 45-49). Kust et al teaches that this may allow recycling of the calcium fluoride for industrial purposes (col. 2, lines 22-25) and improved settling of the calcium fluoride product (col. 6, lines 12-26)

10. Therefore, it would have been obvious to one with ordinary skill, in the art at the time of the invention, to modify the method of Turner et al and Bridger et al by removing the water-insoluble material from the reaction unit as taught by Kust et al, because this would allow recycling of the calcium fluoride

for industrial purposes (col. 2, lines 22-25) and improved settling of the calcium fluoride product (col. 6, lines 12-26)

11. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (US 5,584,981) in view of Bridger et al (US 5,225,056) and Kust as applied to claim 1 above, and further in view of Heit et al (US 3,607,694).

12. Regarding claim 2, Turner et al, Bridger et al, and Kust are applied as above.

13. Neither Turner et al, Bridger et al, nor Kust explicitly teach that the cationic species is ammonium and the anionic species is fluoride.

14. Heit et al teaches electrolytically processing a mixture containing cations and halogen anions or halogen anion salts (where the Examiner is construing the halogen anions as comprising fluoride) where the cation may be ammonium. (col. 4, lines 21-27). Heit et al teaches that this allows recovery and regeneration of the halogen acid and its salts. (col. 1, lines 4-6).

15. Therefore, it would have been obvious to one with ordinary skill, in the art at the time of the invention, to modify the method of Turner et al and Bridger et al by using a mixture where the cationic species is ammonium and the anionic species is fluoride as taught by Heit et al, because this would allow recovery and regeneration of the halogen (e.g. fluorine) acid and its ammonium salts. (see Heit et al, col. 1, lines 4-6).

16. Claims 4-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (US 5,584,981) in view of Bridger et al (US 5,225,056), Kust et al, and Heit et al (US 3,607,694) as applied to claim 2 above.

17. Regarding claim 4, Turner et al, Bridger et al, Kust et al, and Heit et al are applied as above.

18. Neither Turner et al, Bridger et al, nor Heit et al teach that the reaction unit comprises a calcium precipitation unit and the reactant is calcium that reacts with the fluoride to form solid CaF_2.

19. Kust et al teaches passing an aqueous fluoride solution into a calcium precipitation unit thereby to form CaF_2. (col. 2, lines 45-49). Kust et al teaches that this may allow improved settling of the calcium fluoride product. (col. 6, lines 12-26)

20. Therefore, it would have been obvious to one with ordinary skill, in the art at the time of the invention, to modify the method of Turner et al, Bridger et al, and Heit et al by passing the concentrated aqueous fluoride solution into a calcium precipitation unit to form CaF_2 as taught by Kust et al, because this would allow improved settling of the calcium fluoride product. (see Kust et al, col. 6, lines 12-26)

21. Regarding claim 5, Kust et al teaches that a source of calcium as a solution or slurry is continuously admitted to the calcium precipitation unit. (col. 4, lines 24-38).

22. Regarding claim 6, Kust et al teaches that the source of calcium is a slurry of calcium carbonate or of calcium hydroxide. (col. 3, lines 64-68)

23. Regarding claim 7, Kust teaches that depleted aqueous solution continuously discharged from the ion adsorption unit may be used to prepare the solution or slurry of calcium. (Fig. 1, parts 17 and 18, col. 5, lines 1-5)

24. Regarding claim 8, Kust et al teaches that eluate from the calcium precipitation unit is used to prepare the solution or slurry of calcium. (Fig. 1, part 15, col. 5, lines 5-7)

25. Regarding claim 9, Kust et al teaches that the amount of calcium admitted to the calcium precipitation unit may be less than the stoichiometric amount for capturing fluoride (col. 6, lines 37-40)

26. Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Turner et al (US 5,584,981) in view of Bridger et al (US 5,225,056), and Kuwata et al (US 6,274,019 B1) and further in view of Kust et al (US 5,403,495).

27. Regarding claim 10, Turner et al teaches an apparatus for use in treating an aqueous stream containing both anionic and cationic species, the apparatus comprising: a circulation system containing (i) an ion adsorption unit comprising a water permeable zone of an ion adsorbing material (Fig. 2, parts 14 and 34, col. 5, lines 50-59) and means for enabling an electrical potential to be applied across a thickness of that zone (Fig. 2, parts 36 and 13, col. 5, lines 50-59) and (ii) a reaction unit in which one of the anionic and cationic species is rendered substantially insoluble (Fig. 2, part 37, col. 5, lines 50-63); an inlet for receiving an aqueous solution containing the anionic and cationic species and eluate from the reaction unit to the ion adsorption unit (Fig. 2, part 33, col. 5, lines 61-62); an outlet for discharging concentrated aqueous solution of one ionic species from the ion adsorption unit (Fig. 2, parts 19, col. 6,

lines 11-15); and an outlet for discharging depleted aqueous solution from the ion adsorption unit (Fig. 2, part 35, col. 5, lines 61-62).

28. Turner et al does not explicitly teach a pump for continuously circulating aqueous solution around a loop of the circulation system.

29. Bridger et al teaches a pump for continuously circulating aqueous solution around a loop of the circulation system (Fig. 1, part 4, col. 3, line 9). Bridger teaches that this allows desired pH values for the reaction to be reached by recirculating the electrolyte through the cell. (col. 2, lines 23-24).

30. Neither Turner et al nor Bridger et al explicitly teach an outlet for discharging an insoluble material from the reaction unit.

31. Kust et al teaches an outlet for discharging an insoluble material from the reaction unit. (Fig. 1, parts 30 and 34, col. 5, lines 8-15). Kust et al teaches that this allows removal and recycling of the solids for industrial uses. (col. 2, lines 21-25)

32. Neither Turner et al, Bridger et al, nor Kust et al teach an inlet for water into the closed loop circulation system.

33. Kuwata et al teaches an electrodeionization apparatus with an inlet for water into the closed loop circulation system. (Fig. 1, Make-up water, col. 4, lines 5-15). Kuwata et al teaches that this prevents scales from forming in the concentrate chambers or electrode chambers. (col. 2, lines 52-54)

34. Therefore, it would have been obvious to one with ordinary skill, in the art at the time of the invention, to modify the apparatus of Turner et al by adding a pump for continuously circulating aqueous solution around a loop of the circulation system as taught by Bridger et al, because this would allow desired pH values for the reaction to be reached by recirculating the electrolyte through the cell (see Bridger, col. 2, lines 23-24); providing an outlet for discharging an insoluble material from the reaction unit as taught by Kust et al, because this would allow removal and recycling of the insoluble material for industrial uses (see Kust et al, col. 2, lines 21-25); and providing an inlet for water into the closed loop circulation system as taught by Kuwata et al, because this would prevent scales from forming in the concentrate chambers or electrode chambers. (see Kuwata et al, col. 2, lines 52-54)

35. Regarding claim 11, Kust et al teaches that the reaction unit is a calcium fluoride precipitation unit (Fig. 1, parts 10, 20 and 30, col. 4, lines 29-33 and col. 5, lines 8-15) which comprises an inlet for an aqueous solution or slurry of a calcium source (Fig .1, part 12, col. 4, lines 34-38), an inlet for concentrated aqueous fluoride solution (Fig. 1, part 18, col. 4, lines 47-53), an outlet for calcium fluoride (Fig. 1, part 34, col. 5, lines 8-15) and an outlet for aqueous fluoride eluate (Fig. 1, part 15, lines 8-15).

36. Regarding claim 12, Kust et al teaches that the inlet for the aqueous solution or slurry of the calcium source is operatively connected to a mixing vessel in which the calcium source is mixed with water. (col. 7, lines 26-29)

37. Regarding claim 13, Kust et al teaches that the mixing vessel is operatively connected to the outlet for depleted aqueous solution from the ion adsorption unit (where the Examiner is construing the pretreatment reactor of Kust as connected to the outlet for depleted aqueous solution from the ion adsorption unit of Turner and/or Bridger). (Fig. 1, parts 10, 12, 14, and 16, col. 5, lines 64-66)

38. Regarding claim 14, Kust et al teaches that the mixing vessel is operatively connected to the outlet for aqueous fluoride eluate from the calcium fluoride precipitation unit (where the Examiner is construing the waste water inlet of Kust as connected to the outlet for depleted aqueous solution from the ion adsorption unit of Turner and/or Bridger). (Fig. 1, part 18, col. 4, lines 47-53)

Response to Arguments

39. The 112 second paragraph rejections of claims 1, 2, and 4-14 are withdrawn.

40. Applicant's arguments with respect to claims 1, 2, and 4-14 have been considered but are moot in view of the new ground(s) of rejection. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

41. Furthermore, a continuous process is obvious in light of a batch process performing the same steps. See *In re Dilnot*, 319 F.2d 188, 138 USPQ 248 (CCPA 1963); MPEP 2144.04(V)(E)

Conclusion

42. Claims 1, 2, and 4-14 are REJECTED. Claim 3 is CANCELLED.

43. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to COLLEEN M. RAPHAEL whose telephone number is (571)270-5991. The examiner can normally be reached on Monday-Friday, 9:30 a.m. to 6 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Keith Hendricks can be reached at (571) 272-1401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/C. M. R./
Examiner, Art Unit 1724
October 7, 2011

/Keith D. Hendricks/
Supervisory Patent Examiner, Art Unit 1724